



EXAMINATIONS COUNCIL OF SWAZILAND

Junior Certificate Examination

ADDITIONAL MATHEMATICS

519

October/November 2018

2 hours 30 minutes

Additional Materials: Answer Booklet/paper
 Geometrical instruments
 Mathematical tables (optional)
 Electronic calculator
 Graph paper (2 sheets)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do **not** use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions

All working must be clearly shown.

Electronic calculators may be used.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures.

Give answers in degrees to one decimal place.

For π , use 3.142 or the value given in the specific question.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The total marks for this paper is 100.

This document consists of **6** printed pages and **2** blank pages.

1 A bag has 2 blue balls and 3 green balls.

A girl tosses a coin and chooses a ball from the bag.

- (a) Draw a possibility space diagram showing all possible outcomes. [3]
- (b) Find the probability that she gets
- (i) a head and a blue ball [2]
- (ii) a green ball and a tail [2]
-

2 (a) An aeroplane flies from point *A* to point *B* on a bearing of 130° for 420 km.

- (i) Draw a sketch to show the journey of the aeroplane. [2]
- (ii) Calculate how far South of *A* the aeroplane travelled. [3]
- (iii) Find how far East of *A* the aeroplane travelled. [3]

(b) The angle of elevation of a tall building from a point on the ground 230 m away is 14° .

Calculate the height of the building. [3]

3 (a) You are given the function $f(x) = \frac{2-5x}{4}$

Calculate

(i) $f(0)$ [2]

(ii) the value of x if $f(x) = 8$ [3]

(b) Solve the inequality

$$\frac{2}{3x-1} > 7$$
 [3]

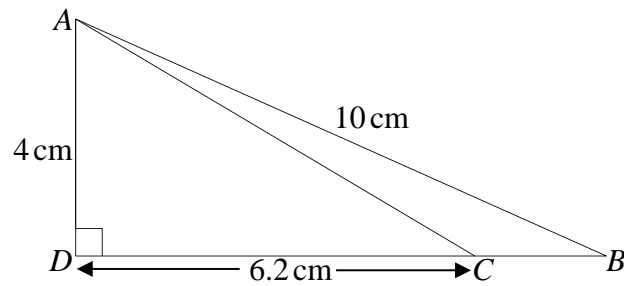
(c) Solve the simultaneous equations

$$3x + 5y = 9$$

$$x + y = 3$$
 [3]

4 The diagram below shows points A , B , C and D .

$AB = 10$ cm, $AD = 4$ cm, $CD = 6.2$ cm angle $ADC = 90^\circ$.



Calculate

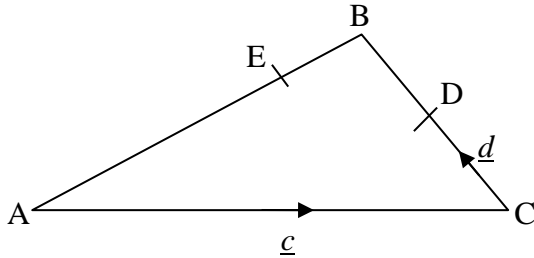
- (a) angle ABD [3]
- (b) BC [4]
- (c) the area of triangle ABC [2]

- 5 (a) $A = 2\pi r(r + h)$
- (i) Make h the subject of the formula. [3]
- (ii) Find h when $\pi = 3.14$, $A = 634$ and $r = 5$. [2]
- (b) Factorise completely
- $x^2 - x - 12$ [2]
- (c) Simplify the expressions
- (i) $\frac{3}{x-2} - \frac{4}{2x-1}$ [3]
- (ii) $3x^2 - 18$ [3]

- 6 (a) ABC is a triangle. D is the midpoint of BC .

E is a point on AB such that $BE : EA$ is $1 : 3$.

$$\overrightarrow{AC} = \underline{c} \text{ and } \overrightarrow{CD} = \underline{d}$$



Find in terms of \underline{c} and \underline{d}

- (i) \overrightarrow{BD} [1]
- (ii) $-2 \overrightarrow{BC}$ [2]
- (iii) \overrightarrow{AB} [2]
- (iv) \overrightarrow{BE} [2]
- (b) You are given the $\overrightarrow{PQ} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$ and $\overrightarrow{QS} = \begin{pmatrix} -9 \\ 6 \end{pmatrix}$
- Find
- (i) $-\frac{1}{3} \overrightarrow{QS}$ [1]
- (ii) \overrightarrow{PS} [2]
- (iii) the magnitude of \overrightarrow{PQ} [3]
- (c) Show that \overrightarrow{PQ} is parallel to \overrightarrow{QS} [2]
-

7 (a) You are given that matrix $\mathbf{P} = \begin{pmatrix} 2 & -3 \\ 0 & -4 \end{pmatrix}$, $\mathbf{Q} = \begin{pmatrix} -3 & 5 \end{pmatrix}$ and $\mathbf{R} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$

Calculate

(i) \mathbf{PR} [2]

(ii) \mathbf{RQ} [2]

(iii) \mathbf{P}^2 [3]

(b) $\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} 5 & 6 \\ 7 & 8 \end{pmatrix}$

Write down the values of a , b , c and d . [2]

(c) \mathbf{D} is a matrix such that $\begin{pmatrix} -2 & 3 & 0 \\ 3 & -1 & 5 \end{pmatrix} \times \mathbf{D} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$

(i) What is the order of matrix \mathbf{D} ? [2]

(ii) Hence write down matrix \mathbf{D} . [1]

8 Answer the whole of this question on a sheet of graph paper.

The table shows some x and y values connected by the equation $y = x^2 + 3x - 4$.

x	-5	-4	-3	-2	-1	0	1	2
y	6	0	-4	-6	a	-4	b	c

(a) Calculate the values of a , b and c . [3]

(b) Using a scale of 2 cm to represent 1 unit for the x -axis and 1 cm to represent 1 unit for the y -axis, draw the graph of $y = x^2 + 3x - 4$. [4]

(c) What is the special name given to such a graph? [1]

(d) Write down the equation of the line of symmetry of the graph. [1]

(e) Use your graph to solve the following equations

(i) $x^2 + 3x - 4 = 3$ [2]

(ii) $x^2 + 3x - 4 = x + 1$ [3]

9 Answer the whole of this question on a sheet of graph paper.

The table shows marks in a test marked out of 50.

Marks	5	10	15	20	25	30	35	40	45	50
Number of learners	0	2	5	9	15	12	9	5	2	1

(a) State the mode. [1]

(b) Copy and complete the cumulative frequency table.

Marks	5	10	15	20	25	30	35	40	45	50
Number of learners	0	2	7							

[2]

(c) Using a scale of 1cm to 5 units on the x-axis and 2 cm to represent 10 units on the y- axis, draw a cumulative frequency curve. [3]

(d) Use your curve to estimate the number of learners who got 33 marks or less. [2]

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